

What is Claimed

1. A sample processing system for processing a sample contained in a liquid, said system comprising:

a) a pipettor having a pipette tip for dispensing liquids, and

b) a cartridge comprising:

(b.1) a chamber which has an inlet and an outlet, said chamber containing a microarray device having an active surface which is formed by an array of different oligomers at known locations, said active surface being accessible to liquid contained in the chamber,

(b.2) an optical interface which provides optical access to said active surface of said microarray device, and

(b.3) an inlet port and an outlet port, said inlet port being so configured and dimensioned that it forms an air-tight connection with the pipette tip when said pipette tip is inserted into said inlet port,

(b.4) a first channel connecting said inlet port with said chamber inlet, a second channel connecting said chamber outlet with said outlet port,

said cartridge being held in such a position in the system that said chamber inlet lies at a lower height than said chamber outlet, whereby liquid supplied to the chamber through said chamber inlet displaces air contained in said chamber and enables a complete and bubble free filling of said chamber with liquid, wherein excess liquid leaves said chamber through said chamber outlet.

2. (canceled).

3. The sample processing system according to claim 1, wherein said inlet port is an inlet channel having an inner surface which fits the outer surface of said pipettor end part, said inlet port and said pipettor end part being thereby adapted to form an air-tight connection.

4. The sample processing system according to claim 1, wherein said inlet port is closed by a closure which is adapted to be pierced by said pipette tip, whereby said inlet port and said pipette tip being so configured and dimensioned that they form an air-tight connection when that closure is pierced by said pipettor end part.

5. The sample processing system according to claim 1, further comprising a thermal interface, whereby the thermal interface allows heating or cooling said microarray device by heat exchange with a heat transfer means.
6. The sample processing system according to claim 1, wherein said inlet port is adapted for receiving said pipette tip inserted in the inlet port coming from a position located above said port.
7. A cartridge for processing a sample contained in a liquid, said cartridge comprising:
 - (a) a flow-cell having a chamber which has an inlet and an outlet, said flow-cell containing a microarray device having an active surface, said active surface being accessible to liquid contained in that chamber, and
 - (b) a housing containing said flow-cell, said housing comprising:
 - (b.1) an optical interface which provides optical access to said active surface of said microarray device;
 - (b.2) an inlet port and an outlet port;
 - (b.3) a first conduit connecting said inlet port of said housing with said inlet of the flow-cell; and
 - (b.4) a second conduit connecting said outlet of said flow cell with said outlet port of said housing, wherein said chamber inlet lies at a lower height than said chamber outlet, and liquid supplied to the chamber through said chamber inlet displaces air contained in said chamber and enables a complete and bubble free filling of said chamber with liquid, wherein excess liquid leaves said chamber through said chamber outlet.
8. The cartridge according to claim 7, wherein said inlet port is an inlet channel having an inner surface which fits the outer surface of a pipette tip, whereby said inlet port and said pipette tip being thereby adapted to form an air-tight connection.
9. The cartridge according to claim 7, wherein said inlet port of said housing is closed by a closure which is adapted to be pierced by a pipette tip, whereby said inlet port and said pipette tip being so configured and dimensioned that it forms an air-tight connection when that closure is pierced by said pipette tip.

10. The cartridge according to claim 7, wherein said housing has a thermal interface that provides access to an outer surface of said flow-cell so that the active surface of the microarray device can be heated or cooled by heat exchange with heat transfer means.
11. The cartridge according to claim 7, wherein said flow cell comprises:
 - (a) a microarray device having a first surface that is an active surface, a second surface on a second side opposite to said first side, and an edge having a peripheral outer surface which extends between said first surface and said second surface,
 - (b) a base plate having a depression for receiving said microarray device, said depression having a bottom surface such that at least part of said second surface of said microarray device being attached to said bottom surface of the base plate, and
 - (c) a cover plate having a transparent or a translucent region,said base plate and said cover plate being so configured, dimensioned and assembled to form a chamber, wherein the chamber has an inlet and an outlet, whereby when the chamber is filled with a liquid sample the active surface of said microarray device is in contact with the liquid.
12. (Canceled)
13. The cartridge according to claim 7, further comprising a frame plate having an opening that defines a cavity above said active surface of said microarray device.
14. The cartridge according to claim 7, wherein said flow-cell chamber has a depth comprised between 0.2 and 1 millimeter.
15. The cartridge according to claim 11, wherein said base plate is made of machinable glass ceramic.
16. The cartridge according to claim 11, wherein said base plate is made of aluminum oxide.
17. A sample processing system for processing a sample contained in a liquid, said system comprising:
 - (a) a cartridge having

(a.1) a chamber which has an inlet and an outlet, said chamber containing a microarray device having an active surface which is formed by an array of different oligomers at known locations, said active surface being accessible to liquid contained in the chamber,

(a.2) an optical interface which provides optical access to said active surface of said microarray device, and

(a.3) an inlet port and an outlet port, said inlet port being so configured and dimensioned that it forms an air-tight connection with a pipette tip when said pipette tip is inserted into said inlet port;

(b) an optical means for performing a optical fluorescence or chemiluminescence scanning of said active surface of said microarray device,

said cartridge being held in such a position in the system that said chamber inlet lies at a lower height than said chamber outlet, whereby liquid supplied to the chamber through said chamber inlet displaces air contained in said chamber and enables a complete and bubble free filling of said chamber with liquid, wherein excess liquid leaves said chamber through said chamber outlet.

18. The sample processing system according to claim 17, wherein said optical scanning means comprises:

(a) a light source for irradiating said active surface of said microarray device with excitation light,

(b) first light filter means arranged between said light source and said active surface for irradiating said active surface with light having a wave length lying in a first wave length range,

(c) a light receiving element for acquiring an image of said active surface or a portion thereof, and

(d) second light filter means arranged between said light receiving element and said active surface so that the latter element receives from said active surface light having a wave length lying in a second wave length range.

19. The sample processing system according to claim 17, further comprising means for drying the active surface of said microarray device.

20. The sample processing system according to claim 19, wherein said drying means comprises a membrane pump.
21. A sample processing system for processing a sample contained in a liquid, said system comprising:
- (a) a cartridge having:
 - (a.1) a chamber which has an inlet and an outlet, said chamber containing a microarray device having an active surface which is formed by an array of different oligomers at known locations, said active surface being accessible to liquid contained in the chamber,
 - (a.2) an optical interface which provides optical access to said active surface of said microarray device, and
 - (a.3) an inlet port and an outlet port, said inlet port being so configured and dimensioned that it forms an air-tight connection with a pipette tip when said pipette tip is inserted into said inlet port;
 - (b) a cartridge holder adapted for holding said cartridge in such a position that the flow-cell inlet lies at a lower height than the flow-cell outlet, whereby liquid supplied to the flow-cell chamber through said inlet displaces air contained in said chamber and enables a complete and bubble free filling of said chamber with liquid, any excess of liquid leaving said chamber through said flow-cell outlet; and
 - (c) a waste container for receiving excess liquid flowing out of the flow-cell outlet.
22. (Canceled)
23. The sample processing system according to claim 21, further comprising:
- (a) an automatic pipetting system,
 - (b) a set of pipetting tips,
 - (c) a control system which operates said automatic pipetting system for performing pipetting operations, said operations including picking up a pipetting tip, loading a liquid sample taken from a sample container into said pipetting tip, inserting said tip into said inlet port of said housing, transferring said liquid sample from the inserted tip to said flow-cell chamber.

24. The sample processing system according to claim 23, wherein each of said pipetting tips is adapted to form an air-tight connection with the inlet port of said cartridge.
25. The sample processing system according to claim 23, wherein said automatic pipetting system and said pipetting tip are adapted for applying air flow to said flow-cell chamber for expelling liquid contained therein.
26. The sample processing system according to claim 23, wherein said automatic pipetting system and said pipetting tip are adapted for applying air flow for drying the active surface of said microarray device.
27. The sample processing system according to claim 23, wherein said inlet port of said housing is adapted for receiving a pipetting tip inserted in that inlet port coming from a position located above said port.
28. A sample processing system for processing a sample contained in a liquid, said system comprising
- (a) a plurality of cartridges, wherein each cartridge comprises:
 - (b.1) a chamber which has an inlet and an outlet, said chamber containing a microarray device having an active surface which is formed by an array of different oligomers at known locations, said active surface being accessible to liquid contained in the chamber,
 - (b.2) an optical interface which provides optical access to said active surface of said microarray device, and
 - (b.3) an inlet port and an outlet port, said inlet port being so configured and dimensioned that it forms an air-tight connection with a pipette tip when said pipette tip is inserted into said inlet port;
 - (b) a cartridge holder for holding said plurality of cartridges; and
 - (c) a waste container for receiving excess liquid flowing out from any and all of the outlet ports of said plurality of cartridges.
29. A sample processing system according to claim 1, said system further comprising a cartridge holder adapted for holding said cartridge in such a position that a plane defined by the active surface of said microarray device forms an angle with a horizontal plane defined by the base of said cartridge holder so that said inlet lies at a lower height than the outlet.

30. The sample processing system of claim 30 wherein the inlet and the outlet are positioned in said chamber such that the space between the active surface of said microarray device and the optical interface is completely filled with liquid prior to discharge of any liquid through said outlet.
31. The sample processing system of claim 30 wherein the inlet and the outlet are each located within a plane that runs parallel to the plane defined by the active surface of said microarray device.